

## **Operation and Maintenance of Large-Capacity Septic Systems**

In Nevada, a large-capacity onsite sewage disposal system or septic system is defined as a system having the capacity to discharge equal to or greater than 5,000 gallons per day (gpd). These systems can be one large tank or a group of smaller tanks under one ownership that serves commercial and/or multiple-dwelling structure(s) on a common property. Influent to the septic tank(s) is limited to domestic wastewater only. The Nevada Underground Injection Control (UIC) Program now regulates these systems under a General Permit to operate, originally issued in 1993. This permit is for both the verification of installation and the authorization to operate the system, and is required as long as the system is active.

### **Overview**

The modern septic tank is a watertight, two-chambered box installed below ground surface. Incoming sewage should be held in the tank for at least 24 hours in order to improve settling. Up to 50 percent of the solids will decompose into liquids and gases. When waste material enters the box, several things occur:

1. Organic solid material floats to the surface and forms a layer that is commonly called “scum.” Bacteria in the septic tank set about to biologically convert this material into liquid.
2. Inorganic or inert solid materials that cannot be biologically converted, and the by-products of bacterial digestion, sink to the bottom of the tank and form a layer of commonly called “sludge.”
3. A cloudy liquid lies between the two layers and is the only ingredient that should overflow into the soil absorption area (leach field). This liquid can percolate down through the leach field(s) to groundwater.

### **Avoiding Failures and Costly Repairs**

**The overflow of solid material into the leach field(s) should be avoided because it will clog leach field lines and soil pores in the absorption area(s) and eventually result in system failure.** Three factors contribute to solid material overflow: hydraulic overloading, bacterial deficiency and sludge accumulation. A properly functioning system helps prevent ground water from being polluted by bacteria, viruses and nitrate. It is also important to minimize water/sewage discharges to the system to prevent hydraulic overloading. Routine maintenance will prolong the life of your septic system. Compared with the cost and hassles of repairing or replacing your system, the effort and expense of annual maintenance is minimal.

The costs for pumping a tank (15 to 20 cents per gallon) are minimal compared to repair or replacement of a leach field and distribution box (\$5,000 to \$15,000) or replacement of the entire system (\$20,000 - \$30,000). It makes good financial sense to maintain and pump your system rather than having to repair or replace your system due to neglect.

Some facilities, such as mobile home parks, can have solids accumulate faster than others. As a general rule, no solids other than human wastes and toilet paper should be flushed. Educate your tenants and staff on the do's and don'ts.

Bacteria must be present in the septic tank to digest the organic solids. Normal domestic waste provides enough bacteria to digest the solids unless the bacteria are destroyed. Bacteria are very sensitive to environmental changes and may be destroyed by common products such as, but not limited to, the products listed below:

**Avoid dumping these products down the drain!**

Detergents	Cleaning compounds	Disinfectants
Polishes	Toilet cleaners	Sink and tub cleaners
Bleach	Caustic drain openers	Acids
Paint	Varnishes	Thinners
Pesticides	Waste oil	Photographic solutions

Labels carrying any of the following warnings indicate the presence of ingredients that may destroy essential bacteria:

“Harmful if swallowed”;

“Avoid contact with the skin”;

“Do not get in open cuts or sores”; or

“If product comes in contact with eyes, call a physician immediately”.

Look for products labeled “Safe for use in septic systems”.

Commercial septic tank additives will not eliminate the need for periodic pumping. In fact, some additives may actually cause damage to the system or surrounding soil and vegetation and may contribute to chemical contamination of groundwater.

### **Maintenance**

A septic tank must be maintained and inspected regularly. **NEVER ENTER A SEPTIC TANK.** The depth of scum, sludge, and total liquid in the septic tank(s) must be measured and recorded on an annual basis or as directed by NDEP. During the septic tank inspection, the condition of the inlet and outlet baffles or tee assemblies should be checked for structural soundness. The primary maintenance point in a septic system is the septic tank. Inspection is accomplished by measuring the scum, sludge, and total liquid depths in the tank at least once a year. It is also necessary to check the distribution box to ensure it is level, and there is an even flow to all leach line sections.

Cleaning, checking for failure or damage, and pumping of the system components do not require prior notification to NDEP. Records for these services/maintenance activities must be retained and included on your required annual report to NDEP. A Nevada licensed professional engineer must prepare and stamp all plans and specifications and submit to NDEP prior to work being conducted. The engineer must also oversee installation and certify installation pursuant to approved plans.

You have the option to hire a licensed pumping contractor to inspect your system and measure scum and sludge layers, or you may take these measurements yourself.

The frequency of pumping the septic tank(s) will depend on the size of the tank, the number of people occupying the building(s) served by the tank(s), the volume and type of solids in your waste, and the condition of the system. Failure to pump periodically can cause solids to overflow into the leach field(s). This can clog the system and may force replacement of leach field piping or even the relocation of the leach field(s).

The tank must be pumped by a State of Nevada licensed pumping contractor (listed under “Septic” in the Yellow Pages) when one of the following conditions exists:

- The bottom of the scum layer is less than 3 inches above the bottom of the outlet baffle;
- The scum layer is more than 12 inches thick;
- The sludge level is less than 12 inches below the bottom of the outlet baffle, or
- The total of the scum and sludge depths are equal to or greater than half the liquid depth.

When the septic system is pumped, all solids must be removed and the inlet and outlet tees or baffles checked. If either is damaged, make repairs promptly and properly. This will prevent solids from entering the drain field(s). In order to prevent the outlet from clogging with solids, clean effluent filters at time of pumping.

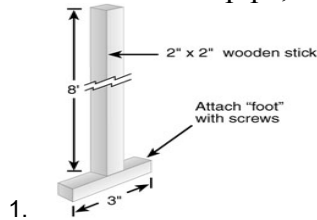
### **Inspection and Measurements Instructions**

**ALWAYS WEAR PROTECTIVE GLOVES AND EYEWEAR WHEN WORKING AROUND YOUR SEPTIC SYSTEM. NEVER ENTER A SEPTIC TANK. ANY WORK OR REPAIRS SHOULD BE MADE FROM THE OUTSIDE. THE SEPTIC TANK PRODUCES TOXIC GASES THAT CAN KILL A PERSON IN A MATTER OF MINUTES.**

If you choose to perform the measurements yourself, there are two frequently used methods for measuring the sludge and scum layers inside the tank. One method uses a clear plastic tube with a check-valve on the end that can be pushed through the different layers to the bottom of the tank. When brought back up, the tube retains a sample showing a cross-section of the contents of the tank.

With the second method, the layers can be measured using a long wooden stick. Attach a 3 inch long piece of wood to one end of the stick to form a “foot” (see Figure 1). To measure the scum depth (see Figure 2), lower the stick through the manhole until the foot rests on the mat of the scum. Mark the stick at the top of the tank opening. Force the stick down through the scum layer and bring it back up until you feel resistance from the bottom of the mat. Mark the stick again. The distance between the two marks is the scum depth. Locate the lower end of the submerged tank outlet baffle or tee the same way.

To measure sludge depth (see Figure 3), drop the stick through the hole previously made in the scum layer until you feel resistance. Mark the stick at the top of the tank opening. Force the stick all the way through the sludge to the bottom of the tank and mark the stick again. The distance between these two marks is the sludge depth. If the tank has a baffle in front of the outlet pipe, measure the sludge behind that baffle.



1. Figure 1. Wooden stick for measuring scum and sludge depth in a septic tank.

Source: MU Extension

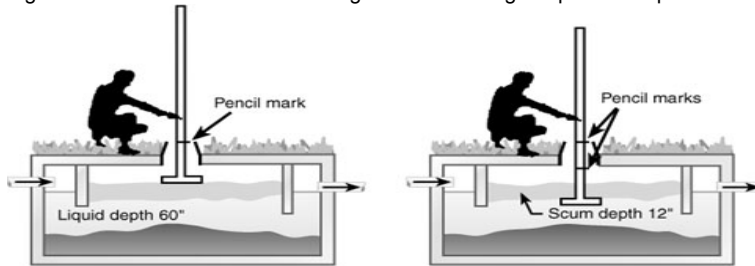


Figure 2. Measuring the scum level in the septic tank. Left: Lower the bottom of the board to the top of the mat of scum. Mark the stick at the top of the tank opening. Right: Force the board all the way through the mat. Bring it back until you feel the bottom of the mat. Mark the stick again. The distance between these two marks is the scum depth.

Source: MU Extension

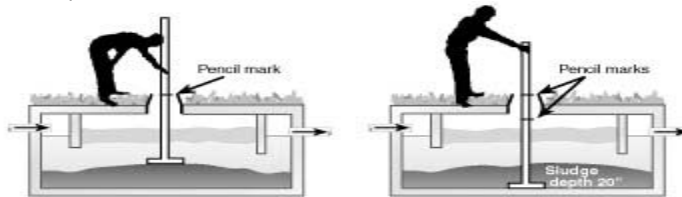


Figure 3. Measuring the sludge depth in the septic tank. Left: Measure the depth of liquid and the depth of sludge. Let the stick drop until you feel resistance. Mark the stick. Right: Force the board all the way through the sludge to the bottom of the tank. Mark the stick again. The distance between these two marks is the sludge depth. If you do not know the maximum available liquid depth for your tank, measure from the bottom of the board to the wet line on the stick to find out.

Source: MU Extension